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**ENGAGE: A Game Based Learning and Problem Solving
Framework (Task 1 Month 7)
Progress, Status and Management Report
Monthly Progress Report**

**Period Covered by the Report
September 1 through September 30, 2012**

Date of Report: October 15, 2012

Project Title:
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Technical Information

1. Technical Progress / Highlights - Observations

We are in the midst of rolling out our suite of games and evaluation tools to schools and online educational resources. Our games have been incorporated into the K12.com curriculum for the school year, placed on PowerMyLearning, and are currently in processing for Edmodo and BrainPOP. We are actively working with school districts Adams 50 (Colorado), Houston ISD and the League of Innovative Schools to make the games available on their respective platforms.

Work was done towards designing assessments this month. Due to having multiple versions of the assessments, we will be able to understand more and explain outcomes with more certainty than we able to previously. We are considering a variety of individual research questions:

- How does time spent playing the games affect learning outcomes?
  - Is there a certain amount of time required to affect learning?
  - Are there differences across the games in terms of time needed to learn?
  - How does the number of level completed in each game affect learning outcomes?
- How much exposure to particular concepts in each game is needed for understanding of those concepts (as measured by the assessments)?
- Do students who collect more gems in Treefrog have differences in learning outcomes from those who do not collect as many gems?
- Does previous exposure to the game affect learning outcomes?
- Are there differences in learning between gender, grade, ethnicity, special education status, previous math achievement, and rates of free and reduced lunch?
- Are we better at covering certain concepts better than others?

All of these questions inform the answer to the larger question: *How much do students learn from playing the Center for Game Science games?*

We are also working on the teacher control panel interface, not only with teachers but specialists in teacher training as well. Getting teachers to utilize student data well is a critical area. For this aspect of research, we are looking at the following questions:

- How does facilitated time playing the games affect teacher candidate fraction content knowledge?
- How does a teacher's playing of the game affect their ability to design mini-lessons to assist students?
- How might a teacher design a mini-lesson in anticipation of an upcoming range of problems to a particular group of students?

2. Results or Problems and Solutions

Now that the games and the teacher portal are released into the "wild," bug reports and technical support requests have begun to flow in to our development team. This is to be expected at the rollout of any new software product, so a large part of our focus this month has been on stability, support, and the overall ease of use of our system. We expect this bug-fixing and refinement to be an ongoing process throughout the winter.

3. Significant Accomplishments Anticipated During Next Reporting Period

We will have active, ongoing use of the games by students. Data collection from these students will give us insight into the game's usage patterns, popularity and potential bottlenecks. Assessments for both paper and in-game online testing will be designed.

4. Publications relevant to this effort

- Two papers submitted to CHI 2003. The first one describes the automatic generation of progressions of problems. The second one describes the mass scale randomized study that analyzes what kind of hinting mechanisms promote engagement and enable learning. Over 20,000 elementary school students data is part of the study.

5. Meetings and Events (Please include meetings with subcontractors)

- Sept 12, 2012, Talk at Applied Brilliance, Haworth Seattle
- Sept 14, 2012, Talk at National Academies of Engineering, Detroit Michigan
- Sep. 24, 2012 – Education Nation – Play to Learn: Teaching Tools for the Digital Era. New York.
- Sep. 24, 2012 – Visit to Computer for Youth in NYC for discussions on possible joint distribution
- Sep. 24, 2012 – Visit to Sesame Workshop in NYC for discussions about using our analytics engine within the future sesame plans
- Sep. 25, 2012 – Game developed in 40 hours based on direct specifications provided by student and teacher townhall meetings (Students wanted a game about collecting embedded in the world of magic and wizards, teachers wanted a game on fractions) Released at the EducationNation web site here.

6. Changes to the Contract Organization

We are spending as budgeted except in that the category of subcontracts. Individual consultant agreements are being prepared which will increase spending in a few months. The consultants will cover the key areas of learning domain expertise, experimental design and conducting some of the school trials. We are happy that we have secured the contracts with two world leaders in the learning science field:

- **Carol Dweck** (Stanford), is one of the most famous psychologists studying the mindset students have while learning. Her work on growth mindset revolutionized the field by showing that having the right mindset to learning is far more important than any acquisition of knowledge: the learners who have the perspective that with more work their mind grows and they invariably get better at anything shows to strongly correlate with success in life and interest in learning. We are excited to incorporate the concepts of growth mindset into our games, and determine whether we can change children's outlook on education as a whole by using game incentives. Both Carol and her student will be on our consulting payroll starting in November.
- **Daniel Schwartz** (Stanford) studies student understanding and representation and the ways that technology can facilitate learning. He works at the intersection of cognitive science, computer science, and education, examining cognition and instruction in individual, cross-cultural, and technological settings. A theme throughout Dr. Schwartz's research is how people's facility for spatial thinking can inform and influence processes of learning, instruction, assessment and problem solving. Dan is the most eminent researcher in this field and will help us in designing models of student thought that will inform better data predictions. We will work together towards using the principles of contrasting cases as a means of conveying knowledge and removing misconceptions. With this approach it seems possible to cover the entire depth of material through games, not just certain easily transferrable elements. Both Dan and his student will be on our consulting payroll starting in November.

With these two new consultants we expect to have new exciting research directions with enormous upside towards effectiveness of game-based learning, thus covering our Task goals.

We are also planning to hire a school community liaison since we will have more than 5 school districts as part of our trials in the spring and next fall. This facilitator position will remove the last expected UT Austin subcontractor role. This new role is very necessary for the large scale studies we're conducting. As a result of the new consulting roles and a new school community liaison position, internal data analyst hired in the previous month, the work that was to be done by Prof. Martin and UTA is being entirely accounted for. We also expect to catch up with the grant expenditures and close the gap significantly by the end of the year 1 of the grant, closing it fully by mid of year 2.